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THE AMERICAN JOURNAL OF SOCIOLOGY

VOLUME XI

MAY, 1906

NUMBER 6

SCIENCE AND CITIZENSHIP¹

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I. An eminent sociologist has recently spoken of the "bankruptcy of science as to any choice of ideals of life," and we are told that "sociology, no more than mechanics or chemistry, has any policy." That doubtless is the prevalent view in these reactionary time when apostasis from science is almost a fashion. The object of this paper is to maintain the contrary view. The logic of its argument may be open to revision; but the normal principle from which it starts will not be gainsaid. It is embodied in the well-established maxim: "If a lion gets in your path, kick it." There are those who believe that the way out of the present tangle of sectionalisms is to be found, not by turning back, but by pressing on. If science cannot direct us, we must direct science. All life is growth, and science understood as a spiritual phase of racial life, a mood of humanity, may, like other spiritual growths, be trained and guided, within limits. Here as elsewhere the essential condition of guidance is the presence of an ideal and moral impulse toward it. It is the contention of this paper that the ideals of science, always implicit, are now actually in process of being explicitly formulated, and that these ideals give promise of a policy of civic development. And once to see and feel this movement of science is to participate in it, to forward and to direct it.

¹A popular lecture given to the Manchester Sociological Society, Nov. 13, 1905.

II. In a first and rough approximation, it may be taken that the middle term between science and policy is potency. The conception of potency presents itself to us with a reality and force proportional to the frequency and intensity of our first-hand, immediate, and direct contact with nature. The conception doubtless reaches a vanishing-point in the mind of that urban breed of domesticated animals which is cut off from nature by the continuous confinement in the cages called town houses. This variety of animal degenerates into a sort of city subnatural species, with supernatural cravings. The city in its evolution is, of course, a natural phenomenon. But within the city the barriers between man and nature are numerous and formidable. Among the dwellers in the cities it is probable that the only persons who are in habitual contact with nature are mothers and poets. To the mother the infant is an embodiment and epitome of all the potencies of nature. The baby, as has been well said, is a bundle of potencies. Its development through adolescence to maturity is the realization of its potency for evolution or for degeneration. The process of growth is, in the proper sense of the word, the education of the child; that is to say, the drawing-out of its potencies. In its training and education the primary factors are three. These are the hereditary predispositions of the child, the resources available for its education, and finally the ideals of the mother. It is the last which is perhaps the most important for the progress of culture; for, of the three factors, the ideal of the mother is the most variable, the most modifiable, and therefore the most subject to control and guidance. The mother's ideal is a compound of types of humanity that have most appealed to her in actual life, in romance, and in history. In other words, it is, whether she knows it or not, the historic or racial imagination of the mother that determines her ideals. She directs the education of her child toward her personal ideals of strength, of health, and wealth; toward her personal ideals of beauty in person, of wisdom in thought, of goodness in deed. And in proportion as these different aspects of the mother's ideal of manhood and womanhood harmonize into an imaginative unity, a synthetic reality, in that

proportion she has an educational policy for her child. Policy is but a name for a system of dealing with one's resources for a definite purpose. In short, a policy is a scheme for the development of potencies in the direction of an ideal realization.

III. What is the relevance of all this for science? There are two dominant moods or manifestations of science: the cosmic, naturalistic, or geographical mood, on the one hand, and, on the other, the humanist, the historical, the idealist mood. In the former, the cosmic mood, the scientist feels a relatively slight interest in the human race and its doings. There are so many more impressive phenomena in the field of observation. Are there not one hundred thousand species of beetles, compared with a single species of man? The entomologist bulks larger in science than the sociologist, simply because the boy is father to the man. The scientist in his cosmic mood is a stereotyped, a perpetual boy. The curiosity of the boy about the wonders of nature ceases for the moment, when his collection of curiosities fills the last of his pockets. But the pockets of the scientist take the form of extensible museums; and hence the temptation to go on collecting, until the habit determines his life, and in course of time he finds himself unable to feel either the cosmic or the human emotion.

As the boy sometimes grows into the man, the cosmic scientist may grow into the humanist one. He no longer observes the phenomena of nature as a mere series of sequences and coexistences following each other in endless succession. He looks upon nature as a reservoir of resources for the use of man. He seeks out the potencies of nature, foresees their possible developments and conceives his ideals of human life in terms of the optimum expression of known potencies. In Bacon's phrase, man controls nature by obeying her. In this respect science is just the ordered and growing knowledge of the ways of nature leading to human evolution. Science, in its pure and applied forms, here stands for the collective resources of the race available for the maintenance and advancement of human life. Science is thus—in terms of the illustration used above—a sort of generalized mother of men, as it were a race-mother. And if the policy and ideals of

science for her children are slow of formulation, that is because of the slow evolution of science itself. Arrested at the cosmic stage of thought, the majority of scientists do not recapitulate, with sufficient completeness, the racial evolution of the group to which they belong. Such racial recapitulation is, as has been well said, nature's way of preparing for a fresh start. And unless, therefore, the individual scientist, in his own personal development, passes on from the cosmic, physical, or naturalist phase, to the humanist and idealist phase, he does not undergo the preparation necessary to enable him to contribute to the advancement of science in its proper historical evolution. In this arrestment of the development of most individual scientists is doubtless to be found an explanation of the slow evolution of the humanist or sociologist sciences.

If we understand by spiritual power a set of established beliefs—like Mohammedanism, Romanism, journalism—influencing conduct and determining the mode of life, then we must say of science that it is an incipient rather than an actual spiritual power. In this sense there are sciences, but no science. If we look around us among our contemporaries, we should, most of us, have to search far before finding an individual whose life and conduct are unified by science. Notable examples are, to be sure, numerous in history—such as Lavoisier and Condorcet, Helmholtz and Pasteur, Darwin and Clifford; and, if it is permissible to cite living scientists, Berthelot and Haeckel, Francis Galton and Karl Pearson. Similar, though less notable, contemporary instances are not common; though in all probability they are more numerous in the obscure annals of university and academy, museum and library, than most of us imagine. There are many whose lives are unified by religion, still more by marriage, and not a few by Monte Carlo. But the truth is that as yet science has afforded no rounded doctrine of humanity sufficiently simple and facile for the comprehension of the artisan, the rustic, and the cabinet minister. The difficulty of that achievement lies mainly in the natural-history fact that the scientific habit of mind in the observation of social phenomena, though

it is universal in children, yet persists in few adults. It survives adolescence in a certain number of social investigators—like anthropologists, folklorists, economists, historians, psychologists, etc.—most of whom are so highly specialized as to have lost the instinct we desire for a general doctrine of social evolution. It survives also in a limited number of sociologists, many of whom are reluctant to be labeled with that title. Thus the dispersion and isolation of the sociologists, and the ignorance and unpopularity of the name, are due not so much to the hardness of the word, or the difficulty of the doctrine, as to the prevailing inability of the folk-mind to distinguish between science and socialism, between science and skepticism.

IV. Thus, owing mainly to the incompleteness and sterility of the social sciences, the unification of science is very far from being a visible reality, and consequently the influence of the scientific party is relatively slight in every country of the occidental world and least of all, perhaps, in Great Britain, with the possible exception of Spain and Venezuela. It was but the other day that the only high-level meteorological observatory of Great Britain was closed and the staff dispersed, the records ignored—even unexamined—and the apparatus offered for public sale—all because the influence of the scientific party was not equal to securing for its support about £500 out of the 140 odd million pounds which constitute the annual national budget. In laudable over-estimate of the desire of other European governments to possess meteorologists, the government of the Argentine Republic cabled to secure the staff of the Ben Nevis Observatory; and, as they were in this partly successful, it may be that what has been lost to the British Empire by this calamitous misadventure is to be preserved for science. A measure of the relative weight exercised in the councils of the nation by the scientific and militarist parties is seen in the annual grant made by the central government to the collective university chests of Great Britain and Ireland. This grant is about £100,000 per annum. That is about the sum expended in keeping in commission, for a year, a single first-class battleship. And if we add to this an allowance for de-

preciation and certain necessary incidental expenses, the annual cost of a first-class battleship would probably reach to three times the university grant; for a first-class battleship costs about a million sterling to build, and is not effective for much more than a decade; and the addition of each one to the fleet necessitates for its full efficiency an increase of dockyard and harbor accommodation, the cost of which, if it were known, would probably be found to run into hundreds of thousands of pounds. A final illustration: An eminent astronomer, who had spent a long life alternately in the observatory and as professor in university classrooms, recently retired. That his salary had been little more than the earnings of a successful artisan need be no ground of reproach to the good scientist; but the rigid application of official regulation, framed for a somewhat dissimilar purpose, resulted in the allocation of a pension which was entirely insufficient to provide for the few and simple wants of the aged astronomer in his retirement. Representations were made to the central government and a complacent officialdom awarded an increase of the pension at the amount and rate of two shillings and sixpence per week!

If we assume that at present there is no science, but sciences—unclassified, and therefore ungeneralized—it would seem to follow that there is no scientific ideal, but only scientific ideals—unharmonized; and no scientific policy, but only scientific policies—uncoordinated. The scientific party—or what would be the scientific party if there was a common doctrine to give it cohesion—is broken up into disparate groups, most of which do not speak each other's language. For instance, the mathematician and the physiologist are separated from each other by a wide arc in the circle of the sciences; but they have this in common that each holds it an article of faith that he would fall short of his scientific duty if he did not acquire the language of France, Germany, and Italy, as well as of England. But if it should happen that here and there a mathematician or physiologist takes the pains of learning the language of comparative ethics, folklore, economics, or any other sociological field, he will be held by his brother-mathemati-

cians and physiologists to be doing what is at best a work of supererogation, at worst an act of reprehensible wastefulness. The scientist of the physical or biological group regards it as much and as little a matter of scientific obligation to acquire the language of the sociological group as that of the Hottentots. What, then, amid this apparent confusion and disruptiveness of science, is the inquiring citizen to do, if he wishes to know the bearing of science on citizenship? The answer of science, as of every other spiritual power, is that there is only one way to know the doctrine, and that is to lead the life.

V. The scientific quality of citizenship can be apprehended only through the scientific conception of the city. And the first question which science asks about the city is: What is it?

What is a city? Legal and political definitions we have, but seemingly no scientific ones as yet. Now, legal and political definitions, whether of cities or of other social phenomena, are, as it were, ready-made articles of common usage, alike popular and recondite. To the majority of scientists—that is to say, those arrested at the mechanical stage of scientific thought—such definitions are alternately meaningless mysteries to be scoffed at, or shibboleths naïvely adopted by these scientists themselves, whenever social action is unavoidable or social thought demanded. On the other hand, there is a small, but ever-increasing number of scientists who push on through the world of form with which the mathematical sciences deal, onward through the world of matter with which the physical sciences deal, and thence through the world of organic life with which the biological sciences deal; and finally attempt to explore, in a scientific spirit and with scientific methods, the world of mind and society with which the psychological and social sciences deal. And this, as already stated, is the normal progress of the mind. We see it exemplified by most of the great leaders. We see it, for instance, in Helmholtz, who began his career as a mathematician, passed through that to physiology whence it was but a single step into psychology: and in the later period of his life he interested himself most in education and social questions. The same tendency

is seen in Darwin's transition from the *Origin of Species* to the *Descent of Man*. We have been told that the sociologist is an individual who has failed to make a career in one of the preliminary sciences, just as, according to Disraeli, the critic is a person who has failed in literature. In point of fact, this doubtless is often true; but the contrary proposition still more widely holds, that the successful mathematician, physicist, or naturalist is just an arrested sociologist.

Returning to the question of legal and political definitions, we have to note that these are to the psychologist and sociologist an essential part of the raw material upon which he has to work. They are points of departure in his observations, and often supply valuable clues in his researches. What definitions of the "city" are available for the purpose? They differ, of course, from country to country; but whether propounded by a lawyer, by a politician, or by the man in the street, they belong, in the eyes of the comparative psychologist, to the folklore of their country. In short, they are pre-scientific. In England, the legal definition of a "city" is, as everyone knows, a place which is or has been the seat of a bishopric. In other words, a city is essentially a cathedral city. To this we must return later, merely noting it now as for the sociologist a great "pointer fact" (in the phrase of Tylor). In the United States of America the conception of a city is, in appearance at least, of a more material kind. In that country there is no lack of resources of observation, for it is a place where a crop of new cities is grown annually. The progress of city-making may be seen as a matter of almost daily observation in new and rapidly developing states of the Union, like Oklahoma and Alaska.

VI. There is perhaps no more representative type of American civilization, and also therefore of the dominant phase of the contemporary western world, than the American railway engineer. He is the true Viking of the times, and is already on the way to plant his forges, and open his lines of communication, all around the margin of the Pacific Ocean. What is the conception of a city in the mind of the American engineer? Direct items of evi-

dence may be gathered from almost any of the innumerable reports on new railway enterprises which are common documents, not only in the great cities of America, but also in the capitals of western Europe. The following extract is taken from a typical document of this sort. An eminent engineer is reporting on a proposed railway from Oklahoma into Indian Territory. He records and surveys centers of population, actual, incipient, or prospective, along the route of the projected line, taking one center after another in the following fashion :

Chickasaw is the recording town of the Nineteenth District. Population claimed, 8,000. The town site has an area of 1,246.19 acres, and is located in the valley of the Washita River, surrounded by rich farming lands, where corn, wheat, oats, rye, potatoes, and all kinds of vegetables, fruit, and berries grow in abundance. Horses, mules, and cattle are raised.

It is an incorporated city with a city government, and is the recognized jobbing center of the southwestern section. Contains, among others, the following industries :

Chickasha Cotton Oil Co.; capacity, 120 tons per day.

Chickasha Milling Co.; capacity, 800 barrels of flour per day.

Two elevators; capacity, 100,000 bushels.

Chickasha Iron works.

Choctaw Mill and Elevator Co.

Traders' Compress Co.; about 30,000 bales.

Electric planing mill.

Steam brick plant.

Wholesale grocery, hardware, furniture, saddlery, and harness stores, and general merchandising.

The city is provided with electric-light plant, ice plant, two telephone exchanges, water-works and sewerage, gas plant (under construction).

It will be noticed that this engineering conception of the city does not envisage a single culture institute—not even a church or public house. This, however, is an omission rectified in a document issued by the Seward Chamber of Commerce in August, 1905, descriptive of the growing towns and cities of Alaska. Of Seward itself the document says :

Although but one year old, it contains general stores of every kind, hotels, ten saloons, a bank capitalized at \$50,000, a daily newspaper, four churches, a flourishing public school, an electric-light plant, and a telephone exchange.

Of a place called Fairbanks we are told :

The city had a population of 7,500 on July 1, 1905, and was equipped with every modern convenience, such as telephone, electric light, water-works,

churches, public schools, and a daily paper receiving a full telegraphic report of the world's news.

It is clear that what the American railway reformer understands by a city is not a city at all, but a town; i.e., in the admirably direct and concrete phraseology cited, it is a "jobbing center." To the list of the urban "conveniences" the chamber of commerce standard adds churches, schools, newspapers, and saloons. And the progress in civic ideals is signal; for churches, schools, newspapers, and saloons are institutes of culture, which are seen to be the lower institutes of culture only when contrasted with cathedral, university, scientific society, and art museum as the higher ones.

VII. A visitor to any of the goods stations of the railways running into London from the North will see any day of the year, but more particularly in the autumn, vast numbers of coal-laden trucks awaiting delivery. It may be said of at least two of the northern railway systems that they exist for the purpose of carrying coal to London. The traveler who is carried, in about two hours, from St. Pancras to Nottingham in a luxurious restaurant car may imagine that the Midland Railway is designed and administered for his benefit and comfort. But that is an illusion of the unreflecting citizen. The truth is that the luxurious restaurant car is itself a by-product of the coal traffic. In the eyes of the representative railway engineer the cities of England are primarily just the terminal yards of the collieries, and the citizens themselves, according to his ethical scheme, rank in status and civic worth in proportion to the capacity of their respective factory furnaces. With literal and historical accuracy, the typical railway engineer sees the modern locomotive as just an elaborated pit-pump engine placed on wheels, and engaged all day in hauling coal-laden trollies from the pit mouth to the cities, and all night in hauling them back empty. To the railway engineer science is a means of transmuting the energy of coal into cities and citizens. It follows that his policy of city development—or, as one should rather say, urban expansion—leans to the erection and multiplication of lofty chimney stacks. The ideal citizens, pictured in

the carbonaceous logic of his occupation, are stokers and chimney-sweeps. It requires little observation and less historic insight to verify the affirmation that urban expansion in the nineteenth century was largely determined by the unavowed but real ideals of a coal civilization.

The archæologists who are so industriously deciphering the buried histories of cities have found the accumulated survivals of seventeen different cities in Rome. And so for other historic cities, the successive phases of city formations are marked by layers of superimposed debris, like geological strata, with which indeed they are in direct continuity. Each successive civic formation is characterized by the impressions and the marks of its contemporary inhabitants, which survive in respective material structures like so many sociological fossils. Looked at from this point of view, the coal-laden trucks and the factory chimney stack with all their associated structures, economic and æsthetic, are actual or incipient sociological fossils of the coal cities of the nineteenth century.

To the dwellers in these coal towns—for cities in the proper sense they, most of them, were not—science presents itself as a kind of inverted philosopher's stone. The accumulated applications of science in the coal civilizations did not end with the production of gold, but rather began with it, more particularly that which came from Australia and California about mid-century. Given a possession or control of sufficient quantity of the precious metal, the citizen finds himself able to initiate a cycle of transmutations and to carry it on up to a certain point, after which it appears that the cycle completes itself automatically. This sort of scientific magic transformed coal into power to make cheap goods for the consumption of cheap laborers, and the cheap labor thus applied itself to produce more power to make more cheap goods for the consumption of still cheaper laborers; and so on indefinitely. This ever-extending series of transformations evidently reaches its culmination in the growth of an ideal city like East London which so magnificently surpasses all other cities in its accumulated reservoir of cheap labor. Such are the ideals of

civic policy which tend to work themselves out in fact and history, if not in word and theory, when city development gets arrested at the town stage.

VIII. Unfair as it would be to English, not less would it be to American civilization, as a whole, to impute to it the conception of civic status restricted to the limitations of the railway engineer, or even of the chamber of commerce. The United States is not only the country of railway cities and railway kings; it is also the country, *par excellence*, of schools, universities, and educationists. The American "schoolmarm" balances the American Viking, and the world trembles in the hope and expectation that some day she may succeed in taming and domesticating him. In no other way, probably, can his disforestings and devastations be effectually stopped, and his destructive energies converted to more constructive ideals.

If we define a "university" as a degree-granting institution, then there are over seven hundred universities in America. It is the aspiration of every American city to possess its own university. The university is, in a sense, the cathedral—a somewhat truncated one, doubtless—of the American city, and every citizen is unhappy until his city gets what he conceives to be its full complement of culture, in the possession of a university. Here as elsewhere the principle holds, *Cujus regio, ejus religio*; and we may agree with Herder's saying that "the school is the workshop of the spirit of God," provided we are allowed the proviso of defining the divine artificer as the God of that region. Minerva is building again her temples over the land, and nowhere more assiduously than in the United States.

These 700 to 800 American universities are, it is true, reduced to more modest dimensions in the impartial list of the *Minerva Jahrbuch*. The German Compilers of this annual census of the academic world admit only 70 universities in the United States. This number compares with a list of 21 universities in Germany, 16 in France, 18 in Great Britain, 78 in the rest of Europe, and for the whole world 236.

How far may we accept a certain vague popular sentiment

which attributes city rank to a town that possesses a university? That, to be sure, would be a criterion of civic status unrecognized by, and unknown to, the lawyer and the politician. But universities are not institutions that appeal to juristic and political minds. In Russia the state corrects academic exuberance by occasional application of the military musket and the police baton; in India, by proscribing progressive literature; in England, by the more subtle processes of financial starvation. There is in the normal undergraduate mind a youthful ardor which is highly resistant to the juristic ideals which lawyers and politicians call stability, and physiologists call ossification. Is, then, this popular conception of the civic importance of the university a useful starting-point for the sociological investigator? In any case, it is a well-recognized truth that popular conceptions are, for science, more convenient points of departure than culture ones, since they are nearer to that naked and unadorned order of nature to which the scientist must constantly return for the verification of his thought.

IX. Assuming, then, as a provisional criterion, the possession of a university as a determinant of civic status, we have in the university cities of the world 236 objects which actually exist in time and space. Here is an abundance of concrete objects for observation, without which the scientific investigator, whether of cities or of other phenomena, cannot get to work at all. His methods, as he is apt somewhat wearisomely to remind us, are those of observation and classification, by comparison, generalization, prediction, and verification by return to the concrete. To put it most briefly, the method of science differs from the method of other orders of thought in the necessity for arranging the various stages of investigation in such a way that two possibilities are always open. In the first place, it must be possible for every member of the scientific fraternity, present and future, to retrace and repeat every vital step in any and every investigation, from simple concrete observation right up to the largest generalization. In the second place, it must be possible to return from the largest generalization, the loftiest aspiration, back to the concrete facts

of nature, by a continuous series of steps, by an unbroken chain of evidence. This is the sacred way of science. In most, if not all, great religions of the East, a peculiar sanctity attaches to the conception of the "way." That a mystic flavor should cling to methodology will not therefore be surprising to those who hold that science is a culture form of natural religion.

X. Having provisionally agreed upon our scientific criterions, we have 236 definitive objects that exist in space and time under the designation of "city." From this proposition, it follows that, by taking adequate precautions, cities can be seen. It is true that to see even a single city is a feat which few of us ever achieve. Few of us ever succeed in seeing even our own city, let alone others. Hence the widespread illusion that cities consist of shops, factories, and dwellings, with public houses at the corners—these being the objects presented to the eye as one passes along the open tunnels called streets. But there are certain animals, like birds, butterflies, and some human beings, that have the habit of viewing terrestrial objects from a height. And it is obvious that it is in vertical perspective only that a city can be visualized. The habit of viewing objects both terrestrial and celestial from a height was apparently much commoner among the human species in former than in the present times. Otherwise how explain the wide occurrence of special facilities for the purpose? The mounds, the pyramids, the towers of many kinds which past civilizations have erected in such abundance have doubtless various origins. But when facilities occur, as they generally do, for reaching the summits and thence making observations, we are bound to infer that we are dealing with real observatories, and deliberately planned for that purpose; whatever other purposes, religious, ceremonial, commemorative, æsthetic, these constructions may also have served. Our recent and contemporary civilizations continue to adorn or supplement our buildings with towers as inevitably, and one is inclined to say as automatically, as the beavers build their dams and the bees their hives. But more often than not we do not provide a stairway to the summit; or, if we add that, how seldom are facilities provided for observation from the summits! Even

to the old church and castle towers that survive, with their stairway and their observing platform, access is generally made difficult or impossible to obtain. We lock them up, and if that does not guard them against the curiosity of the citizen and tourist alike, there are other well-known modes of generating indifference. There is the custom of charging an entrance fee, which represents a considerable slice out of the worker's day. And if all these precautions shall fail, there is the final and frequent recourse of losing the key. Assuredly the gods first blind those whom they wish to destroy.

The Imperial Institute in London, which commemorates the jubilee of Queen Victoria, is adorned with a handsome and commodious tower of many stories. In each story there is a large chamber. A visitor in the early days of the institute asked permission to enter and ascend the tower. The officer in charge was complaisant and offered to conduct the visitor over the tower. The key could not be found, and the visitor said he would return another day. On his next visit he was told that the key had been found, but it was not considered advisable to use it, for the structure of the tower was defective! Is any further explanation needed of the admitted failure of the institute in the first decade of its existence? Happily it has now been reorganized and has entered on a more useful phase.

XI. In order to see our cities as they really are, we must first of all see them in geographical perspective; and in order to do this, we must recover the use of existing towers. We must also begin building new ones designed and equipped to aid us in seeing with the eye of the geographer. In the scientific vision, the first element is the vision of the geographer. Or, putting it in another way, in the complex chord which we call science, the first note is a geographical one. This vision of the geographer, what is it? Whence comes it? How may we ordinary citizens acquire it? What use would it be to us if we did acquire it?

Our school initiation into geography acquaints us with a certain scheme of form and color symbolism which we call a map. The impression which intimate familiarity with the maps of our child-

hood leaves on the mind is apt to be a picture of the country called France, which is little more than an octagonal red patch; of Spain, a square brown patch; of Scandinavia, an oblong green patch; of the Rhine, a blue line running from a dark patch called Switzerland, to a blue patch called the German Ocean. The experience of reading, observation, and travel doubtless supplements and corrects these crude pictorial impressions. And in proportion to the fulness of such later experience, we approximate more nearly to the vision of the geographer, who sees our globe as it really is, has been, and is becoming, in space and time. The geographer sees the land in its varying relief from seashore, over plain and plateau, valley and height, up to mountain summit. He sees below the surface of the waters, noting the space and level of river-bed, of lake and sea bottom. He sees the crust of the earth everywhere in section, from the lowest and oldest rocks up through the superimposed geological strata, to the superficial deposits which wind and rain, storm and sunshine, snow and frost disintegrate for the making of soil, on which the flora of the world fixes itself and feeds, region by region, and across which the fauna of the world moves and makes its tiny marks and scratches. He sees the surface of the globe, changing from day to day, season to season, age to age, epoch to epoch. And these changes he sees to be brought about in part by the place of the globe in space, and its relation to other celestial bodies, and in part by the very shape, form, and character of the surface and configurations themselves. Thus to the geographer the phantasmagoria of visible things presents itself as a drama—a great cosmic drama in which the part allotted to the human species is both insignificant and predetermined in all essential respects. The operations of man on the planets are, from this point of view, limited and conditioned by inexorable cosmic forces. The roads and railways, by which man connects his cities, are seen to be the merest scratches on the surface of the globe, wholly comparable in their significance to the tracks which the elephants make through the forest or the buffalo across the prairie. The cities themselves are but temporary encampments of herding groups of animals, determined or condi-

tioned by such natural features as a river or a plain, an estuary or a mountain, a coal bed or a forest. How relatively slight a geographical disturbance is made by the building of a city—even a modern capital city—may be realized by recalling that practically the whole of the new town of Edinburgh is built out of a local sandstone quarry, so small that its floor would not afford camping space to a traveling circus.

XII. The foregoing account is intended to suggest the geographer's vision such as he sees it in his naturalist or cosmic mood. But the geographer is himself a man and a citizen, and as geographer he still has his humanist or idealist mood. Viewed in his humanist or idealist mood, the world-drama undergoes for the geographer a profound change. The perspective changes from the cosmic to the human focus. The typical river valley, which is the essential regional unit of the geographer, is no longer a mere fold of the earth's crust, in its endless and aimless cycle of changes, but is conceived as the realization of a great purpose. The long geological history of the river valley is seen as the preliminary preparation to fit it to be the scene of the exploits and aspirations of a god-like race of beings, such as has been suggested and foreshadowed by the noblest type of the human species. The designing and the making of a suitable theater on which the human play may develop, is a thought which gives a new orientation to the geographical conception of the river valley. Now the soil and the vegetation which cover its floor, the beds of coal, iron, sand, and limestone which underlie its surface, the forests which clothe its slopes and shelter its animal world, the metaliferous deposits of its mountain sides, the river which from source to sea invites to locomotion—all these are seen to be but energies and instruments, awaiting for their orchestration the tuning hand and the idealizing mind of man. And the city—the city which embanks and strides the river, which stretches across the plain and juts into the ocean, which ascends the hill-slopes or penetrates the mountains—what is the part and place of this city in the vision of the humanist geographer?

When we think of the river valley as the regional unit of geo-

graphical science, we have to remember that it is like the ovum of biology—a developing unit containing the potency of a great realization. What, to the geographer in his humanist mood, is the city, but the effort of this regional unit to realize its own potency for evolution? City development is thus, for the geographer, no isolated phenomenon, but a normal stage—the culminating one—in a long sequence of events and processes. It is the ceaselessly renewed attempt to make for each region here and now its own Eden—its own Utopia.

XIII. It may be taken as a postulate of social geography that every region contains the potency of a city or cities which shall be for that region, here and now, its heaven or its hell. And in the complexity of causes that lead to evolution toward the ideal city, or toward its negation, there is a geographical factor awaiting discernment, analysis, comparison with the other factors, and resynthesis into a synthetic conception. The traditional *civitas*, the *urbs solis*, and other similar utopist visions, have thus their necessary geographical aspect, unless they are to be completely divorced from reality. To the traveler (who is, of course, an incipient geographer) one aspect at least of the geographical factor is necessarily known. The hard experience of the desert is, to the traveler, a geographical prerequisite of the good time that awaits him in Damascus. And if, dispensing with the geographical prerequisite, he attempts to make his Damascus a perpetual Elysium, what happens? He is not long in discovering the reality of the phenomenon known in archaic phrase as the fall, and he quickly discovers a vital connection between geography and theology. Geography indeed, like every other science, has its element to contribute to the reinterpretation and revitalizing of religious phenomena. If it may be allowed to a modest geographer to revise the judgment of so great a theologian as St. Augustine, it would be to point out the tenuity of his geographical experience. Had St. Augustine been more of a traveler, he would doubtless have avoided the geographico-historical blunder of believing that it is predetermined once for all which are the cities of God and which are the cities of Satan. One of

the truths revealed to us by social geography is that every city is engaged from moment to moment, from day to day, in determining for itself how far and to what extent, here and now, it is, and will become the city of God, and how far it is, here and now, and will become, a city of Satan. In other words, predestination is a recurring, and not a stationary phenomenon.

XIV. It may be objected by some traitorous professors of the science that the humanist note has extremely little part and place in geography, and the idealist one none at all. But it is always open to us to choose our standards of geography from the great founders of the science, rather than from the bookworms parasitic on *Petermann's Mitteilungen*. And, in any case, to the determinist geographer, whose skepticism refuses to see the idealist side of the shield, we may reply in the words of Turner to the critic who protested that he could see nothing in nature like one of the artist's pictures: "Don't you wish you could?" The father of history, Herodotus himself, in passing to humanist studies by way of geography, made a step which, in the normal growth of the geographical mind, does not stop short of the loftiest social and civic idealism. This tendency is abundantly illustrated in the lives of the great founders of modern geography. It is seen in Alexander von Humboldt, who continued and completed his geographical career as counselor of state, and coadjutor, with his more humanist brother, Wilhelm, in the organization of educational institutions. It is seen in Karl Ritter, who, as he progressed in writing his great work, was driven more and more to an emphasis of the historical factor. But it is seen most of all in the life and work of Elisée Reclus, whose recent loss we deplore, and whose place in the history of the science it is too soon to estimate; but there are those who believe it will be a culminating one. The eighteen massive volumes of his *Géographie universelle* were but the preliminary training and preparation for his *magnum opus*, his *Social Geography*, happily completed before his death, though as yet unpublished. But the general character of the work may be foretold by those who were familiar with his riper thoughts. It is safe to assert that his

Social Geography will more fully than ever before demonstrate the continuity and correlation between, on the one hand, the destructive action of man on the surface of the planet, and, on the other, the historical and the contemporary facts of human degeneration and civic degradation. But it will also, unless the work belies the character of its author, demonstrate with unique experience and conviction a continuity of ascent from geographical science to the loftiest aspirations of social idealism.

XV. The geographer's vision of the city as the realization of regional potency is a faculty not of the professed scientists only. It is possessed also, in varying degrees of fulness and clearness, by every wise and active citizen, or at least by every citizen not altogether dehumanized by the machinery of education and affairs, or, as Mr. Wells says, "birched into scholarship and sterility." It was the geographer's vision that prompted the city fathers of Glasgow to transform the shallow estuary of the Clyde into one of the great highways of world-commerce. It was the absence of the geographer's vision that prompted Philip II of Spain to cut off the national capital from access to the sea, by removing it to the arid central plateau. It has been the geographer's vision which has inspired so many German municipalities to purchase and allocate to the commonweal large tracts of suburban territory; and, wanting the geographer's vision, our own municipalities have too often allowed the immediate environs of our cities to become the prey of the jerry-builder and the land speculator. These are obvious and conspicuous examples. But the influence of geographical foresight, or its absence, is to be traced into every ramification of civic policy, into every department of civic activity. To draw upon the resources of geographical science for the construction and criticism of civic policy is a manifest obligation, or, as it ought to be, privilege and pleasure of the city fathers, who are immediately responsible for civic policy, and for the body of citizens who are mediately responsible for the same. But are there not also whole bodies of the citizens, into whose occupation and livelihood the application of geographical knowledge so largely enters that they might almost be called applied geographers?

Is this not true of all those classes engaged in the organization of facilities for travel and communication, from the railway manager to the station porter, from the pilot to the bargeman, from the hotel-keeper to the cabman, from the road-surveyor to the crossing-sweeper? And, in less degree, is it not true likewise of the whole trading class, whose business consists in shifting goods from the place of growth and production to their destination in the hands of consumers? For all these, from the city fathers to the crossing-sweeper, the question is: Does each one utilize to the fullest such resources as contemporary geographical science can and should supply? The president of the Royal Geographical Society is the servant of the crossing-sweeper who has the knowledge and the imagination to use him.

XVI. What are the sources of geographical science? Where are they to be found? How may the inquiring citizen utilize them? How may the crossing-sweeper utilize the president of the Royal Geographical Society? If the inquiring citizen was fortunate enough in his youth to commence a career of travel and exploration, by frequent truancy from school, then doubtless he acquired habits of observation which later on became disciplined into a scientific temperament. Doubtless, in that happy case, he is thoroughly familiar with the resources of geography. But most of us grew up into respectable citizens uninspired by that fear of the schoolmaster which is the beginning of science. And if we have our scientific education still in front of us, we cannot do better than begin it by buying a copy of the admirable annual called the *Science Year Book*, issued by Messrs. King, Sell & Olden, of Chancery Lane.

Of the seven or eight sections into which the contents of this publication are divided, there is one called "Scientific and Technical Institutions." A first glance at the contents of this section might lead one to suppose that the book is of a humorous and satirical kind, for its list of scientific and technical institutions begins with an enumeration of "Government Offices." Saving this lapse, the book is to be taken as a serious manual. It enumerates, and briefly indicates the functions of, ninety-nine

organizations in Great Britain called "Scientific and Learned Societies." These include small new groups, such as the thirty oceanographers who constitute the Challenger Society, and who meet once a quarter in the rooms of the Royal Society in London, and periodically issue a series of oceanographic charts. But among the purely scientific societies, that which attains to the largest membership is the Royal Geographical, with its 4,180 members. The functional activities of the Geographical Society are described as follows in the *Science Year Book*:

1. *Meetings*.—Weekly, November to June, evening; anniversary, fourth Monday in May.

2. *Publications*.—The *Geographical Journal*, monthly; *Year-Book* and *Record*; and various special publications.

3. *Miscellaneous*.—Medals: Two royal gold medals, the Founder's and the Patron's, awarded annually; and the Victoria medal at intervals. Money grants are also made from trust funds. A fine library of upward of 37,000 books and pamphlets is maintained, and a map-room. The latter receives a government grant of £500 per annum, on condition that the public shall have access to the collection.

Now, the monthly *Geographical Journal*, the chief organ of the society, is an invaluable publication, but the only person who, in all probability, reads it through is its own editor; and that is as it should be. Life is too short to read the *Journal* of the Geographical or any other scientific society. But what everyone should do is to utilize the spiritual organization whose visible organs are the whole series of scientific periodicals. To do this we must know how to consult the files of these periodicals; in other words, how to put, and answer, questions through their pages. All these learned periodicals would be more popular, were the common and obvious fact known to editors and proprietors of newspapers—as conceivably some day it may be—that the most abstruse and recondite of scientific journals is nothing but a variety of the familiar publication known as *Notes and Queries* in its higher form, and in its lower forms *Tit Bits* and *Answers*. It would, indeed, introduce an agreeable and useful uniformity in periodical nomenclature if there could be one generic name, with adjectival differentiations, such, for instance, as the *Zeit-*

schrift für Sozialwissenschaft calling itself *Social Notes and Queries*, and the *Archiv für Rassen-und Gesellschafts-Biologie* calling itself *Race Notes and Queries*, and so forth. That the analogy between the popular and scientific variety is real, and not fanciful, will further be recognized when it is observed that what are called conundrums and solutions in the one are called memoirs and hypotheses in the other. And, moreover, the successful contributors are, it will be seen by reference to the above description of the Royal Geographical Society, rewarded, if not by participation in a guinea prize, yet by one or other of "the two royal gold medals which are awarded annually" and "the Victoria medals which are awarded at intervals."

XVII. The *Journal* of the Royal Geographical Society consists of two parts. There is in each month's *Journal* a bundle of maps and a budget of letterpress. In order to utilize the resources of the society, which function through its *Journal* and other publications, one must learn the interpretation of the symbolism and notation of the maps, and one must acquire familiarity with the few technical formulæ which occasionally break through the ordinary and simple language of its letterpress. There are simple, easy, and pleasant ways of achieving both these ends—in fact, short-cuts by which one may penetrate right into the heart of geographical science. To master the symbolism and notation of cartography, all one has to do is to compare the best contour maps (that is to say, those of the Ordnance Survey) with what one sees with naked eye, with field-glass, or with telescope, when one ascends all the high points of vantage in one's own region. These high points of vantage are, of course, for the towns and cities, their towers such as they may be, and for the surrounding country whatever mound, hilltop, or mountain summit one's excursions and explorations may discover. The primary problem of the cartographer is to show, by symbolic notation on a flat surface, all the varying heights and shapes assumed by, or imposed on, the earth's surface above or below sea-level. What the ideal geographer, as cartographer, first of all tries to do is to devise a notation by which he and his fellow-

geographers, by the inspection of a map of a given region, may get a simultaneous vision of the terrestrial phenomena which all the explorers and observers of that region have collectively seen. Now, it must always be that, however minutely observed and explored a region—even the most inhabited—may be, there is always something new to be observed, even in the shape and configuration of the surface, for these are always changing; while the things and events, natural and human, which are continuously happening (for these also have to be mapped down), open up an endless vista for the future development of cartographic science. Hence there is no more easy and natural individual progress than for the schoolboy beginner to pass onward from simple observation of recorded phenomena to discovery of new ones. Once begin in the right way and acquire—which is so easily done—the right habits, and then the position of discoverer will be reached by a normal and natural, an insensible and inevitable, growth. As elsewhere, it is the first step which costs, and here it costs two shillings—that being the price of a “Bartholomew” pocket tourist map for your own region. It will be on a scale of two miles to the inch, if you are fortunate enough to be a Scotsman; and four miles to the inch, if you happen to have the disadvantage of living in England. These maps you carry with you on your walks, your bicycle rides, your river excursions; and when you get back to the town or city of your region, you go to the free or other library where the largest ordnance maps are kept, and you observe how the things you have seen are noted, or are not noted on these ordnance maps. And if they are not noted, there and then you begin your apprenticeship in scientific research, in seeking out other maps which record different varieties of regional phenomena; for example, the kind, the quantity, and the distribution of its fauna and flora; its rainfall and its sunshine; the statistics of its population; its routes and communications, and so forth indefinitely. The problems which the young geographer finds in front of him grow rapidly in number and complexity, but his interest in facing, in investigating, and in solving them will be found to grow

still faster. The explorations in the open air, alternating with research in library and study and map-room, will very soon whet an insatiable appetite for an understanding of the ever-changing phenomena of his region. The pleasures of observation, which, unlike other sensual pleasures, do not pall with usage, are themselves succeeded by the still keener pleasure and intenser joy of generalization and interpretation. In brief, the outlook on the visible phenomena of one's region itself evokes and inspires a craving for insight into the larger world, into which our own region extends on all sides by insensible gradation, and to which it is felt to be linked by innumerable bonds. It is just here, where the margin of his own region melts into that of the surrounding world, that the student requires, and may readily utilize, the full resources of the whole science of geography. His previous reading will have been of the best geological and geographical accounts of his own region, and the comparison of these with what he has seen with his own eyes. This preliminary study will have insensibly familiarized him with the technical phrases and formulæ which are necessary for getting into touch with his brother-geographers elsewhere over the globe, and utilizing the observations, the thought, the interpretation of these, as well as the accumulated writings of their forerunners, in the concerted effort of the whole past and present race of geographers to visualize and to understand what passes on the surface of the globe.

XVIII. To realize the magnitude of what might be called the geographical group in Britain, we must add to the 4,150 members of the society located in London the members of various local societies, such as those in Manchester and Liverpool, and also the considerable number of unattached map-makers and geographical observers and writers. And again to these have to be added the corresponding group in Scotland, of which the Royal Scottish Geographical Society is the nucleus, with its 1,100 members, its monthly *Journal* and other publications issued from its headquarters in Edinburgh; there being associated societies in Glasgow, Aberdeen, and Dundee. And, furthermore, every capital in Europe, and many of the larger of the provincial towns,

contain similar groups of professed geographers with similar organizations, journals, and other publications. The New World also has its geographical societies, and with the formation of one in Japan they are penetrating the Orient. Here, then, is no national, or even international, but a world-wide phenomenon—a universal brotherhood. It is a real fraternity in which the individual members and the several groups are linked together by a highly organized system of intercommunications, by common aims and purposes, by a common method of thought and observation, by a common symbolism and system of formulæ, by common beliefs about the world and men's place therein. To imagine the resources of geographical science, we must think not only of its accumulated documents, instruments, and aptitudes, but also in a still higher degree of the spiritual forces that pervade and animate this universal organization, this world-extensive community of similar minds. And anyone who is learned enough to master the symbolism of geography, to consult the files of the periodical publications, is, if not a full brother, yet a novitiate of this universal fraternity. And to be a member of this community, what does it mean? It means much or little, in proportion to the impulse and knowledge to utilize the collective resources of the community.

XIX. It is the boast—and a real and justifiable boast—of the Catholic church that its pope is a servant of every member of the church down to the most insignificant—that he is, in name and fact, *servus servorum*. Now, in the scientific community there is no pope, but there are many high-priests. The scientific community is a democratic organization, not a hierarchic one. Its high-priests are just those members of the community who have themselves done most to forward the progress of their science. Every high-priest of geography, as of every science, is, in quite a literal sense, a slave of every investigator who is working in that particular field, or a related one. The organization of research, and the system of intercommunications, are so arranged that the tasks that are beyond the strength, and the problems beyond the power, of the ordinary members of the community, are continually being collected and automatically delivered at the

workshop of this or that high-priest. His workshop is usually a small room with a few books and maps. Here, without fee or charge, he completes the unfinished tasks, and solves the harder problems; and hence he delivers the finished goods as a free gift to the community at large. He is fortunate indeed if he escapes without having himself to pay the cost of delivery. The reward of his office is harder work, less pay, and more criticism than that of the ordinary brothers. The high-priest of geography, as of other science, is not differentiated by sartorial insignia, by definitive status, or by obsequious designation, but is generally recognizable by certain personal characteristics—by the world-light that shines from his eyes, by the nobility of his countenance, by his threadbare coat, and usually, it must be confessed, by the baldness of his head. In the common phrase of everyday life, he is known as an “*eminent scientist*.” In the jargon of his profession, he is “*an authority*.”

It is the real, though unexpressed, ambition of every young scientist to become “*an authority*.” In the many graduated stages toward this consummation there is one of special significance. If the young observer steadily continues his observations and interpretations, and faithfully compares his results with the records of science, he will find that he steadily progresses toward a climax. He will some day catch a moment or a mood, a phase or a happening, in the fleeting movement of things, which will thrill him with an emotion intenser than any he has before experienced. He will instinctively feel that one of the secrets of the universe has been revealed to him and to him alone. Under the mysterious glow of unforgettable enthusiasm, he will feel his personality expand, until the self of his ego meets and touches, in a sublime union, the self of the world. In other words, he has been initiated into the fraternity of science, and for the first time he is, and feels himself to be, no novice, but a full brother of the community.

It is clear we are here in the presence of a psychological phenomenon known in another walk of life as “*conversion*.” In science it is known as the discovery of a new truth. It may be a truth which is of the most trifling importance in relation to the

total body of ordered knowledge, which we call science. But the event is, in the life-history of the individual scientist, one of most profound significance. It is, if not a turning in his career, yet an experience which will not be without its effect upon his whole future life. As is the way of the older spiritual communities, the event here, too, is celebrated by a particular ceremony of initiation. The scientific ritual of initiation has two well-marked stages. The first consists in the contribution of a memoir to the proceedings of the relevant society. The second consists of a copious baptism in the form of a cold-water douche of criticism, from his brother scientists.

XX. If the foregoing analysis has suggested a fanciful analogy between religion and scientific experience, it has entirely failed in its purpose. The intention has been, not to suggest an analogy, but to indicate an essential similarity, indeed a partial identity, of type. In the language, not of psychology, but of sociology, the contention is that the scientific and religious groups are vitally related in their social origins and functions. Addressing an audience of biologists, one would probably convey the intended impression by saying that science and religion are social organs which are in part both homologous and analogous. But the rightly discredited usage of biological terminology in social science prohibits recourse to that language. The argument is that science has its social as well as its logical and psychological aspects, and that, from the former point of view, a scientific society is manifestly to be classed among the social institutions; and that, moreover, in the wide and varied range of social institutions, the place of a scientific society is alongside of the church. The characteristics possessed in common by the religious and scientific community can be traced out in detail. If, for instance, the scientist resorts to a public library to read the journal of his particular society, he is obviously paralleling the tendency of the laxer churchman to escape the monthly collection for what in certain nonconformist churches is called the sustentation fund. But minute detail and formal aspect apart, what is it that constitutes the essential similarity of type in the religious and scientific group?

The immense multiplication of religious sects in the present day, and in history, is popularly accounted one of the least creditable features of civilization. The skeptics deprecate it as a bad habit, like alcoholism and immorality, into which the uncultivated man is prone to fall. But in itself, and apart from its secondary effects, the mere proliferation of sectionally religious bodies is simply an expression of spiritual freedom. In joining this, that, or the other church, in remaining within its fold or in leaving it, the individual believes himself to be actuated by non-material motives. He believes that he is uninfluenced alike by the parliaments that make laws, the bureaucracies that administer them, and the judges that interpret, or misinterpret, them. He believes that his religious life is unconditioned by the policeman visible at the street corner, by the sovereign invisible on his throne, and the soldiers that display his royal uniform. In brief, the member of a religious community believes himself to have risen into a world of spiritual freedom, untrammelled by the prohibition and compulsion which in civil history are called law and politics; in natural history, tooth and claw. How far this belief in a life of spiritual freedom is real, and how far it is illusory, matters not for the moment. The point of insistence is that the members of a religious community are bound together by similarity of ideas and feelings, and not by bonds which rest upon a potential recourse to physical force. In other words, the social influences immediately operative upon and among a religious community are mental, moral, and æsthetic. They are not legal and political. And in this respect, at least, it is sufficiently manifest that the scientific community resembles a religious one.

XXI. It is one of the merits of Comte to have aided the progress of thought by generalizing under the one conception of spiritual powers all those agencies and institutions which influence men by mental, moral, and æsthetic considerations. His corresponding conception of temporal powers generalizes agencies and institutions which operate on, or influence, conduct by an actual or potential recourse to physical force. The spiritual powers thus seek to substantiate or to modify belief—using that

term in its broadest sense—using as their instruments ideas and emotions. Temporal powers seek to determine conduct by using material rewards as impulse, and physical fear as deterrents.

The popular distinction between state and church may be regarded as a particular case of the wider popular distinction between the law and the gospel; and this again is a particular case of the larger scientific generalization of temporal and spiritual powers. There are, of course, practical advantages which prompt the popular mind to extend its widening circles of general concepts, which again are further refined and developed by science. The general concept is to a mere collection of facts what regimentation is to a mob of men. It enables one to neglect individual eccentricities, and predict the collective behavior of the group, whether the group consists of items called facts or items called men. The inducement to widen the generalization is, that the larger its scope, the broader are the limits of prediction. The assumption made is that the process of generalization is a gradual one, and that the steps from the concrete facts up to the largest generalization are all traceable without a break. In other words, a generalization must be of a kind which in science is called verifiable, that is to say, the prediction based upon it must refer to a course of future events, which must either happen or not happen at a given place and within a given and finite time. And this proviso of verifiability gives a definiteness and fixity to scientific generalizations which is often absent from those alike of the popular mind or of the poetic imagination.

XXII. There are those who tell us that there is no proper science of society, because there are no known sociological laws. Others go still farther and say that the nature of human society is such that no social laws are discoverable; that there is no science of human society; that sociology not only does not, but never will, exist. This is a mode of argument well known to historians of scientific thought. It has been used at every epochal advance, by the obscurantists, to justify their ignorance and soothe their vanity. It belongs, in fact, to the self-protective devices so common everywhere throughout the organic world, and especially among the higher animals. Probably the most

effective reply to this sort of criticism is for the scientific observer to ignore it, and to continue without interruption his observations and generalizations of them. If those who tell us there are no laws in social science would say instead that they themselves do not know any such laws, we might be happy to agree with them. And if those who say there never can be any such laws would say instead that they themselves are determined never to know any such laws, we might extend to them our compassion and recommend a course of medical treatment.

In point of fact, what generalizations, in the nature of scientific law, are there at the disposal of the sociologist who wishes to predict the future of an incipient spiritual power? A full stock-taking of resources would here disclose a considerable number of working formulæ, which resume a vast mass of experience as to the origin, growth, and decay of various forms of spiritual power.

But for the present purpose the following generalizations especially serve, viz :

1. That spiritual powers, in the course of their historical development, gradually conceive and formulate a social ideal, and this social ideal tends to be in conflict with the existing temporal power.

2. That each spiritual power tends to develop two types of organized community—a type predominantly passive and contemplative, and a type predominantly active and militant.

3. That the active type of spiritual community endeavors to generate a congruent form of temporal power as the material embodiment and mundane expression of its particular social ideal.

4. That in this endeavor various institutions are developed, which help to determine each era of city government both in respect of buildings and of civic policy.

XXIII. The conflict and interaction between temporal and spiritual ideals in the history of western Europe during the Christian period is, of course, one of the commonplaces of social discussion. But the detailed influences and reactions, especially on city development, of the respective ideals of the law and the

gospel, have not been sufficiently worked out. The system of feudal law, which still incrusts occidental civilization, has its animating principle in the mediæval maxim, *Nul terre sans seigneur*, which might be conveniently translated as, in the social sense, "No spot without its despot," and in the civil sense, "No foot of soil without its functionary." The contrast of these ideals with that of Christian ethics—"the kingdom of God is within you"—is sufficiently obvious. But what the student of city development has to do is to trace the expression and interaction of these conflicting ideals in each successive phase of civic architecture and civic policy. Thus, for instance, in the case of London, the sociologist is to see how the Tower and Windsor Castle are the expression and embodiment of certain political ideals, and he is to trace throughout the history of London the influences and ramifications of the Tower and the castle and follow their line of direct descent down to the existing institutions which are their heir, and their functional analogue—these presumably being the contemporary functionary factories of Whitehall. In the same way, he is to see how Westminster Abbey and St. Paul's are the culminating expression and embodiment of certain spiritual ideals; and their influence and reaction on civic life and architecture are likewise also to be traced through successive stages of city development; and the analogous types of institutions today have to be discovered and described alike in their structural and functional aspects. And every city has for the sociologist its corresponding problems of factual observation, of historical analysis, and of scientific interpretation. All these again, to be sure, assume their place as specialist researches within the larger problems of general sociology.

Now, if we apply the fourfold sociological formulæ above indicated to the present and future phases of science considered as a spiritual power, what inferences may we legitimately draw? The existing groups of science, whether or not organized in definite societies, are comparable, we have seen, to the various sects of the religious community. Now, these numerous and various sects, like their more archaic religious types, have their

rivalries, jealousies, feuds, and bickerings. The mathematicians, for instance, are apt to form an exclusive caste apart, holding no converse with groups which know not their particular shibboleths. Again, the spectacle might have been seen, at a recent meeting of the British Association, of rival biological factions warmly anathematizing each other. A momentous and historic instance of scientific sectionalism is seen in the work now in progress, which is probably the largest co-operative enterprise yet undertaken by modern scientists. A few years ago the Royal Society convened in London a great gathering—a sort of Council of Trent—of scientific fathers, representing all the leading academies and societies of Europe and America. The purpose of this great gathering was to decide upon an authorized canon of the sacred texts. A momentous decision was reached. It was concluded that a sufficient degree of traditional sanctity did not attach to the writings of the economists, the psychologists, the sociologists, and some other orders. The writings of these were accordingly omitted from that authorized canon, which is now in course of actual compilation under the title of *The International Catalogue of Scientific Papers*. It is clear from these evidences of internal disruptiveness that science, as a whole, does not at the present moment possess that cohesiveness and unity of aim which are vital to a period of demiurgic spiritual effort.

XXIV. On the evidence of internal disintegration one would infer that science has either passed, or has not yet reached, its constructive synthetic era. But are there not signs around us which point to a coming and then incipient period, in which science will develop its doctrine of human life as a great spiritual power? The clearest notes in this scientific chord which is beginning to sound are perhaps the geographical and the biological ones.

We have seen how the geographer, no longer merely interpreting the present by the aid of the past, is beginning to have visions of the future. In seeing the city as the realization of regional potencies, he cannot but feel also an ideal impulse toward organizing the city as an optimum adaptation of the

regional environment to human life. The geographer's social ideal is, indeed, in process of explicit formulation, and that on many sides. And in its application to a particular city, the most notable perhaps of these formulations may be found in one of the books indicated for reading in connection with this paper. It is Professor Geddes' *City Development*. Here, indeed, the ideal of city development is by no means confined to that of the geographer, but the civic policy there enunciated has its definite starting-point in the geographer's vision of the city. And other similar initiatives are visible in many different directions. The Garden City movement is essentially geographical in its point of departure from traditional civic policies. And the same may be said of Mr. H. G. Wells's *Civic Utopia*, and indeed of all those utopist writings in which the biological note is also sounded which advocate a certain ruralization of the city, whether by the development of parks and gardens, or by other means. However much all these differ from one another in other points, they agree in their emphasis and insistence on a better regional adaptation to city life. It is clear, in fact, that we are here in the presence of a movement toward an applied geography. The division of science into *pure* and *applied* is a familiar one up to a certain point, but it should help us to realize its significance, if we understand it as comparable to the distinction between the regular and secular orders in religious communities. Like the regular orders, the cultivators of pure science concern themselves mainly with doctrine; while the applied scientists, like the secular orders, have their main interest in the application of doctrine to the needs of daily life.

XXV. Among existing groups of scientists, which are the seculars, which the regulars? In the physical sciences it is easy to recognize actual or incipient regular orders in mathematicians, in students of heat, light, electricity, chemistry, etc. On the practical side there is the great body of engineers, with its numerous subdivisions; there are manufacturing chemists, the brewers, the opticians, etc. Are these the secular orders in the physical group? Before answering that question, we must discriminate. The differences of type are very great. It is, for

instance, a far cry from the stoker, or even the driver, of a coal engine at the one end of the scale, to, at the other, the active partner in the firm of White & Co., electricians and instrument-makers; for the active partner in that firm is, or was, Lord Kelvin. It will be urged that Lord Kelvin as instrument-maker and electrical engineer is merged and sunk in Lord Kelvin the professor, the investigator, the theorist. But the opposite interpretation would be equally true, and equally false. The essential point is to see that it is the very coincidence and alternation of theory and practice, of science and art, of thought and action, that above all differentiates and marks off the seculars of science from those of other varieties of spiritual power, And, applying this distinction, we readily recognize that the great majority of engineering occupations do not really belong to science at all, in the proper sense, but are persistent survivals of a pre-scientific age. The empirical rule-of-thumb types of engineer are still predominant, but they essentially belong to a pre-scientific order that has been well called paleo-technic. They do not possess the physicist's vision of the world; still less, therefore, do they seek to apply it to life. The physical scientist in his cosmic mood sees the world as an automatic system of energies, with a tendency to run down, and without a discoverable means of winding it up again, while as to the why and wherefore of its being originally set going the data of his science give him no clue. Looking at the same phenomena in his humanist mood, he sees the flux and transformation of forces take on and assume a definite design and purpose, which the very logic of his science compels him to postulate as an inherent potency in the very system of energies. He sees every form of energy a potential slave of man. He sees the cities scattered over the face of the globe, as the supreme, the collective, the ceaseless effort of the race to realize this potency of energy, to harness it in the service of man. The type of physical scientist in whom the cosmic mood is habitual and dominant is the actual or incipient regular. But where the grand and inspiring ideal of realizing for man the potency of world-energies animates the physical scientist, there clearly we have the possibility of great secular

orders. And that such orders are everywhere incipient and rapidly developing, there are many evidences to show. These evidences are vividly depicted in the sociological writings of Mr. H. G. Wells, who more than anyone else, perhaps, in the English-speaking world has seen, or at least expressed for us in literature, the incipient changes in city development which are being effected by these new secular orders of applied physical science.

The new type of engineer is tending more and more to assume control of the communications of our cities, their factories and workshops, the great public works of water supply, lighting, drainage, etc. And thus gradually determining for us the material conditions of life, the new engineer acquires social status and prestige. And, in pursuance of the well-known sociological law that those who have social power tend also to get civil and political power, we are bound to assume that the engineer types, as they are already tending to control civic policy, will sooner or later seek to control national and even world-policy. That these higher aspirations are already well on the way toward achievement is seen in the influence now being exercised by the railway kings of America, not only in their own country, but also in world-politics. With the advantages brought about by the activities of these new secular orders, there are, of course, corresponding disadvantages. The conception of a city held by the railway engineer is, we have already seen, not that of a city at all, but that of a town. And this limitation applies throughout the whole sphere of thought and action belonging to this phase of life. It manifests itself even in Mr. Wells's utopist pictures of the cities of the future, for in these idealist cities is it not the case that the inhabitants, notwithstanding their manifold cultural activities, have still their main interests in the material aspects and conditions of things? Are they not, in fact, townsmen first, and citizens only thereafter?

XXVI. If the foregoing criticism is a just one, the cause of the limitation is doubtless to be sought in some arrestment of normal scientific development. The physical scientist who remains such falls a long way short of repeating and resuming his normal racial development. For above and beyond the physical

group of sciences, the race has conquered, or is conquering, for science higher domains. Immediately above the physical sciences is the biological group. Here, who are the regulars and who are the seculars? It is not difficult to see the regular type in anatomist and taxonomist, in physiologist and ecologist, in embryologist and paleontologist, in ontogonist and phylogonist. These, or some of them, are doubtless strange names, unfamiliar to the public, even to that small section of the public which enjoys a classical culture. But the groups of scientists thus characterized nevertheless exist, and that, moreover, in growing numbers and influence, all over the western world. They are organized into bodies which are essentially regular orders of an incipient spiritual power; and as such they are silently preparing a great moral revolution. Where are we to look for the secular orders that will be their active instruments of temporal change? The occupations concerned with the biological or organic side of civilization are, of course, those of peasant and farmer, of gardener and stock-raiser, along with medical doctors and surgeons, not to mention the herbalists and the nurses, the barbers and the hairdressers, the gymnasts, and all the lower and older groups of occupations, from and through which the medical profession has risen to its present summit. Which among all these are the secular orders of science, and which the empirical survivals of a pre-scientific age? To answer that, we must first ask what is the special vision of the world which animates the biologist; and, further, we must ask what militant groups are there which this vision stimulates into practical activity. The biologist, like other scientists, has his cosmic and his humanist mood. In the former he sees an endless chain of developing life, beginning he knows not how or why, and tending he knows not whither. In his humanist mood, he sees the same unbroken chain that links together the whole series of organic beings; but now sees in it evidence at every point, from lowest to highest, of a promise and a potency of a supreme culmination. And in the most beautiful and noblest of human beings he sees a norm which, by taking thought, the whole race may reach and surpass. To the biologist the city is thus no mass of mere inorganic structures, but a group

of organic beings, which individually passes away, but racially abides, continues, and develops toward a definite ideal, or degenerates to its opposite. The ideal of the city is therefore to the biologist the full realization of racial potency. Who among biologists are stimulated into activity by this vision of civic potency? Increasingly large numbers of the medical profession are animated by the ambition of preventing rather than curing diseases. The noblest instances of missionary enterprise are paralleled by the self-sacrificing adventures and exploits which daily engage the lives of the enthusiasts of the newer medicine. The missions that go out from the Pasteur Institute in Paris to study, say, typhoid fever in Brazil, or from the Institute of Tropical Medicine in Liverpool to investigate, say, yellow fever in New Orleans, are merely conspicuous instances of a heroic activity that is normal in that increasing wing of the medical profession beginning to be called the hygienists. Of these many are already organized into large and well-established secular orders, such as the various institutes of public health, sanitation, etc., to be found in every large city. Others less directly, but still more vitally, are beginning to influence both civic and national policy through great institutions of the more regular type of order, such as the Pasteur Institute, and similar organizations incipient elsewhere.

XXVII. A new secular order of biologists is beginning to appear in the eugenists, who seek to develop and apply Mr. Francis Galton's doctrine of eugenics. It belongs to this doctrine to rescue the "perfect man" from the lumber of archaic survivals, and restore it, not as an idol of a golden past, but as a legitimate ideal of the future. Taken over from theology by political philosophers of the eighteenth century, the idea of the fall of man from a state of primordial perfection became a powerful solvent of economic and political institutions. An abortive and premature attempt was then made by early biologists and sociologists to use the doctrine as a constructive ideal, by transforming it into the conception of a future perfectibility of type. But in the generation which witnessed the classic demonstration of organic evolution by Spencer and Darwin, by

Haeckel, Wallace, and Galton, the very idea of perfectibility was discredited. Nevertheless, the language of the fall persisted, and of necessity had its unconscious influence on thought. It was therefore quite natural, if not inevitable, that the place of man in the animal series should be worked out in terms of descent and not ascent. But the idea of potency latent in organic evolution was bound to manifest itself.

It was Francis Galton who first, and most fully, made the change from the cosmic and naturalist to the humanist and idealist mood in organic evolution. His doctrine of eugenics shifts the center of interest in man's pedigree from the past to the future. Actually and in point of fact the worst-bred of animals, man has become so because he of all animals has the highest potency for degeneration or for evolution. That is one of the truths revealed to us by evolutionary biology. The other is the legitimacy of aspiration toward a future ideal. But the ideal of evolutionary biology markedly differs from its pre-scientific anticipations. It is an ideal definable as starting from a known potency, and approximately realizable within finite space and time, and to be reached by ascertainable processes, operating within discoverable limits. In short, the ideal of eugenics has the scientific character of being a verifiable ideal, and not an illusory one. It postulates an ideal type, toward which we can definitely steer, and certainly move, with assured hope of approximately, but never actually, reaching it. For the ideal itself undergoes evolution, the very increase of evolutionary potencies and processes being itself the warrant of higher aspirations. Mathematicians express the relation of two paths always converging, but never meeting, by the word "asymptotic." Originating outside the systems of professed philosophers, evolutionary idealism has yet its necessary relations to traditional doctrines of idealism and realism. Its place and correlation with these have yet to be worked out and defined. But meantime it may help toward establishing a point of contact with existing systems of philosophy to say that evolutionary ideals express an asymptotic reality.

XXVIII. The favorite recourse of the ill-informed mem-

bers of a community, to escape the penalties of nescience, is to normalize their own defects and to postulate a universal ignorance. This protective device of the cunning animal is nowhere more frequent than in discussions of the problem of heredity. It is frequently asserted that we know nothing at all of heredity with precision and certainty. It is quite true that the biologists and psychologists have a great deal still to learn about heredity. But it is equally true that they have a great deal to teach. And the citizen as well as the student can escape the charge of hopeless obscurantism only by promptly putting himself to this school. One of the first things he will learn is the deep significance and the practical importance of the distinction between what is called organic inheritance and what is called social inheritance. The former is concerned with the heritage that comes to us in organic descent from our family stock, i.e., the prenatal influences which condition our life. The latter is concerned with the qualities and aptitudes that come to us through training and education, through tradition and experience; in a word through the potential, and therefore social, influences that condition our life. Small or great as may be the ordered and verified knowledge accumulated by the students of organic inheritance, there can be no question of the mere massiveness and quantity of our knowledge of social inheritance and social variation—in a word, of social evolution. Where is all the knowledge to be found? Who are its guardians and continuators? Are they not called historians and economists, political philosophers and comparative jurists, anthropologists and folklorists, psychologists and æstheticists, students of ethics and of comparative religion? Are not all the foregoing of the nature of regular orders engaged in studying the various aspects of our social heritage of industry and commerce, of law and morals, of religion and art, of language and literature, of science and philosophy? But the question for us is: Are these the regulars of social science? If they are not, who and where are the regulars of social science? who and where the seculars? Occupied on the practical side of our social life are the merchants and the manufacturers, the politicians and the lawyers, the journalists and orators, the artists and literary men,

the teachers and professors, the moralists and priests. Which among all these are the seculars of social science? which the persistent survivals of the pre-scientific age?

XXIX. To answer these questions, we must ask: What vision is seen by psychologist and sociologist in their cosmic or naturalist mood, and what in their humanist mood? What potencies do they see in social evolution, in city development? What groups, if any, of more militant type are inspired by these visions of social potency, to work toward the realization of the corresponding ideals? In reply, little can be said at the close of an already prolonged paper. The sociologist in his naturalist mood sees the city as successive strata of wreckage and survivals of past phases in the endlessly changing antics of a building and hibernating mammalian species. In his humanist mood he sees—somewhat dimly, it must be confessed—the city, as the culminating and continuous effort of the race to determine the mastery of its fate, to achieve a spiritual theater for the free play of the highest racial ideals. In short, the cities of the world are in this view but processes of realizing the spiritual potency of the human race. They are the true homes of humanity. And it is just here, where science—whose mission it is to fulfil, and not to destroy—reveals to us the germ of truth in the popular sentiment, which insists that the essential characteristic of the city resides in the university and the cathedral. The truth, to be sure, is that it is the presence of functional institutions of the highest spiritual type, whether or not we call them university and cathedral, that differentiates the city from the town. It follows that the civic policy of our secular sociologists—if we have any—must be concerned with the city as itself a cultural potency, and with the whole body of citizens as individuals responsive to the creative influences of the spiritual ideals, active or latent in drama and poetry, in art and music, in history and science, in philosophy and religion. The most comprehensive abstract and general statement of culture policy from the sociological standpoint still probably remains that made more than half a century ago by Comte in the *Positive Polity*—which was really the utopia of his later thought, educated and matured by the preliminary preparation of the

Positive Philosophy. Fortunately, the four massive volumes of his *Positive Polity* were condensed and summarized by Comte himself, and the contentious elements for the most part omitted, in the single small and cheap volume translated by Dr. Bridges, as a *General View of Positivism*. Ranking with Comte's statement of culture policy in its comprehensiveness of outlook and far-sighted vision, but written from the standpoint of contemporary science, and therefore appropriately detailed and concrete in reference, here and now, in plan and section and perspective, to a particular city, is Professor Geddes' recent book *City Development*, already cited for its geographical vision, and now for its sociological ideals. These two books, from their different but correlated standpoints, express a doctrine whose isolated elements are everywhere recognizable. It is evident, therefore, that the life out of which the doctrine is fermenting is in active growth. If, then, they are not already here, we may be sure the sociological friars are coming.

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II

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4. Ebenezer Howard. *Tomorrow: A Scheme of Garden Cities*.
5. Patrick Geddes. *City Development*. (St. George Press, Bournville.)

III

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